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engineering conference

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Information Technology Directions for Network Centric Operation

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Network Centric Operations

Facilitate timely decision making in a joint collaborative, and secure networked environment.
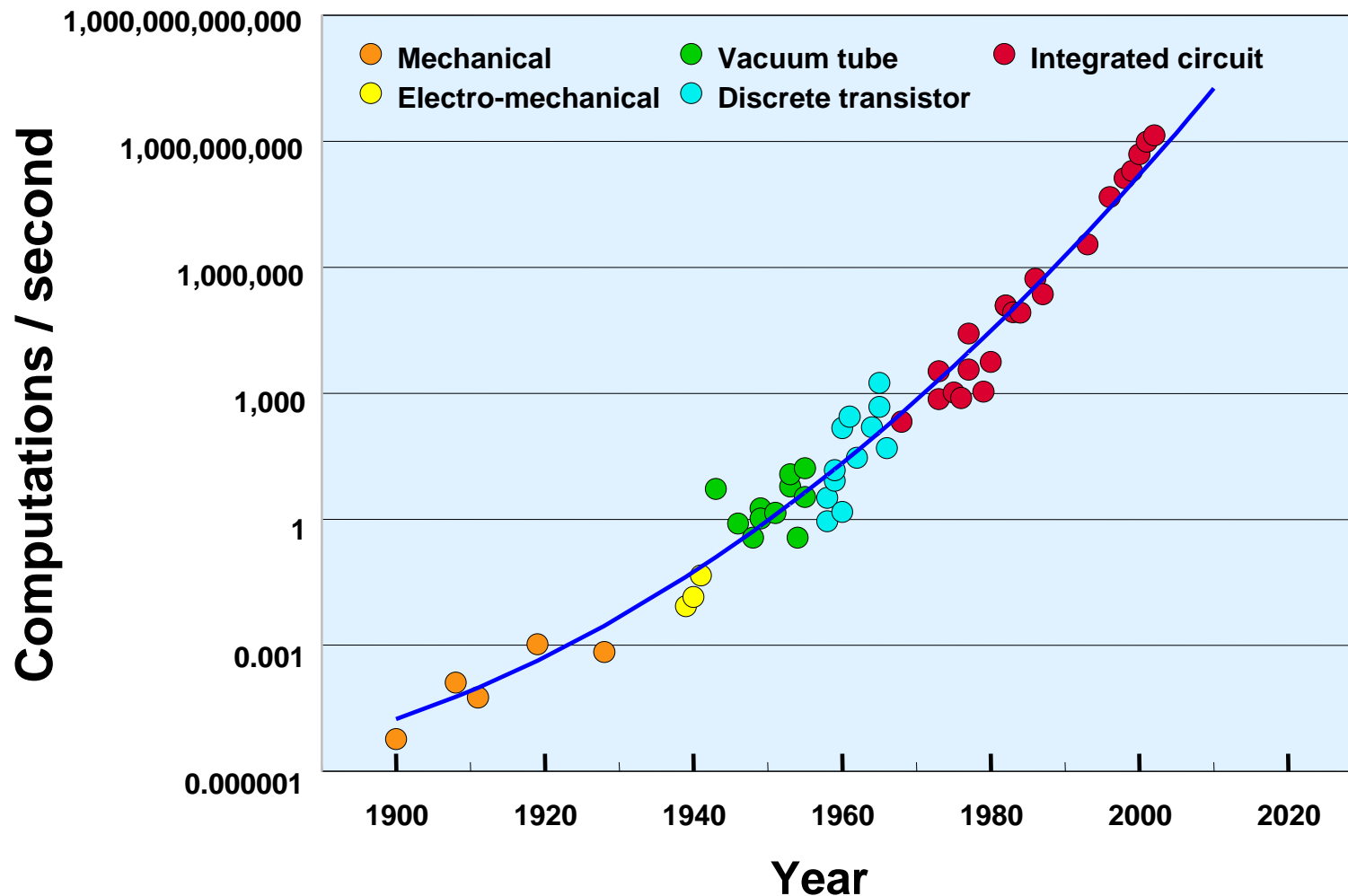
Secure networked battlespace
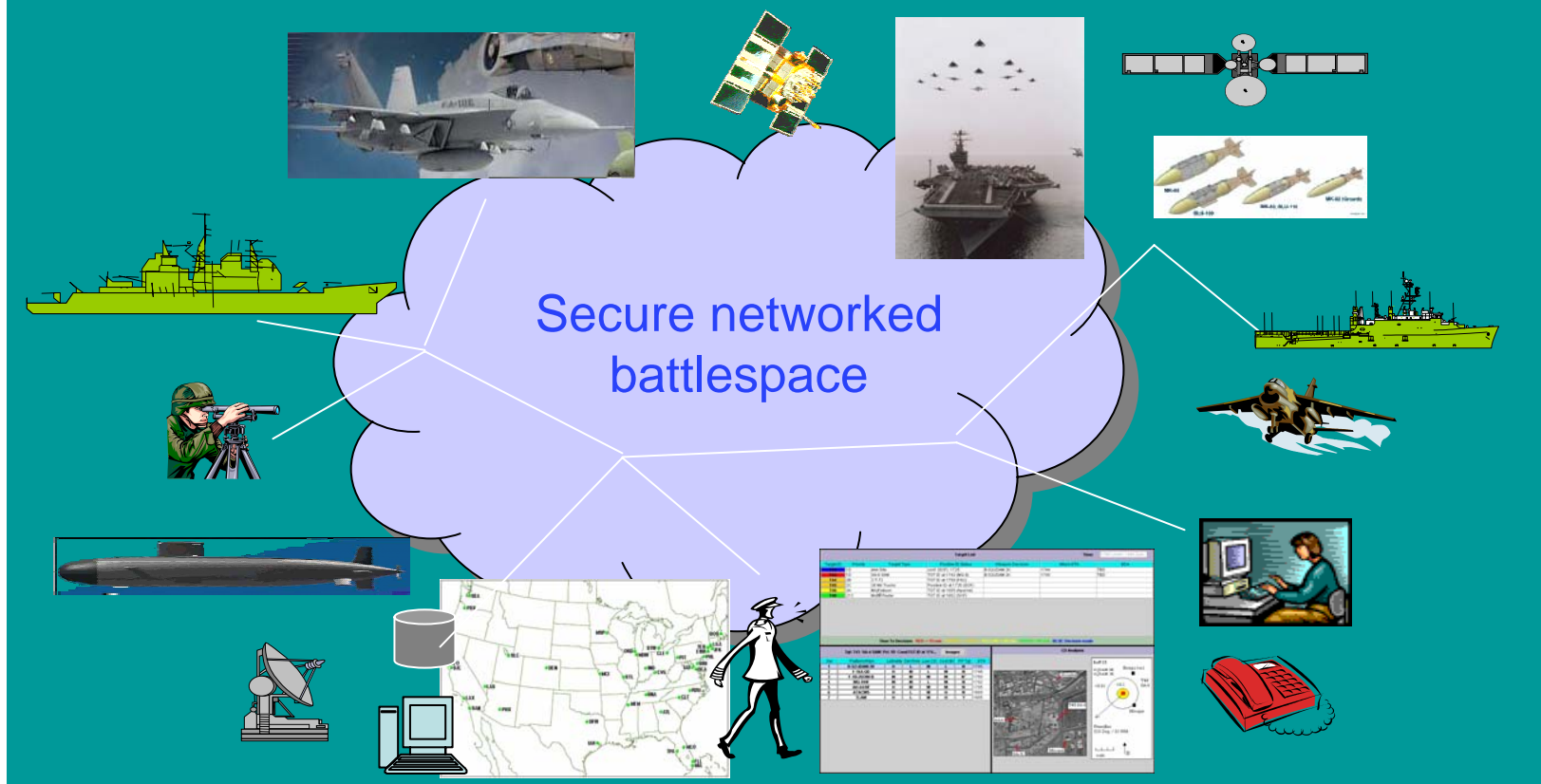
Network Centric Operations

- Massive numbers of sensors of all kinds
  - Unstructured data
- Massive numbers of "actuators" of all kinds
- Massive (potential) connectivity
  - Many partly-connected edges
- Continual connect / disconnect of network entities
- Many human beings, organizations in decision loops

- A nested collection of classic control systems…

- An ***Internet-Scale*** *Control System*

In Computing, $1000 Buys:

Computations / second (y-axis)

Year (x-axis)

Legend:
- ● Mechanical
- ● Electro-mechanical
- ● Vacuum tube
- ● Discrete transistor
- ● Integrated circuit

Y-axis values: 1,000,000,000,000 / 1,000,000,000 / 1,000,000 / 1,000 / 1 / 0.001 / 0.000001

X-axis values: 1900, 1920, 1940, 1960, 1980, 2000, 2020

after Kurzweil, 1999 & Moravec, 1998

jvk1   Work with Boxley to finalize this slide:

1st credit card (bank americard)
1st PC banking
1st mobile phone payments
PayPal
1st ledger package
Go trawl the web for history of this

Can we nail down change time of next tech
Jürg von Känel, 3/10/2003

Enterprise Software Challenges

Enterprise Application Software must continuously evolve to adapt to changing requirements - but the cost can be prohibitive

Electronics Retailer - Application diagram
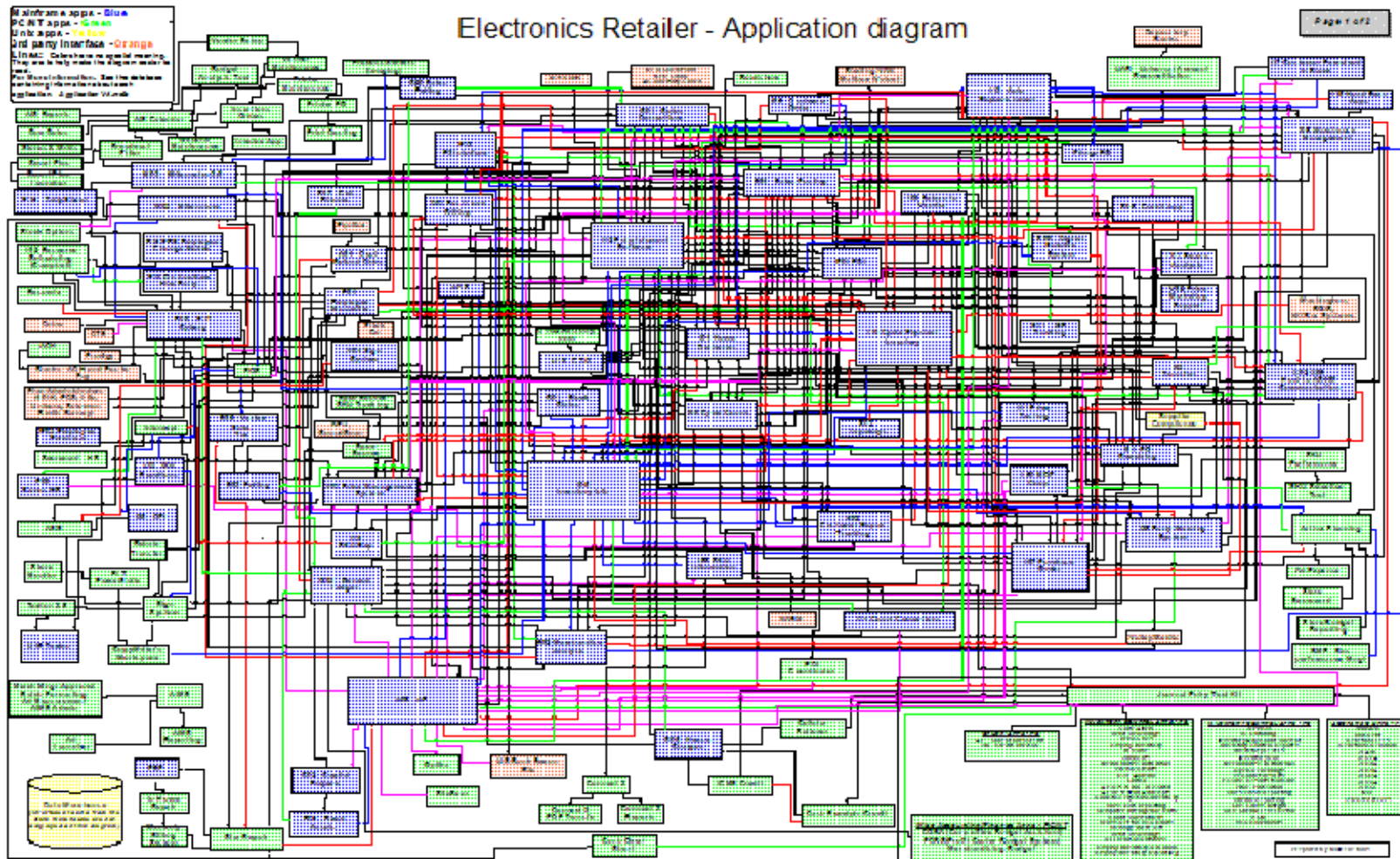
Evolution of an Open Architecture

Silos	Integration ➡	Full Integration

Physical	Virtualization ➡	Grid

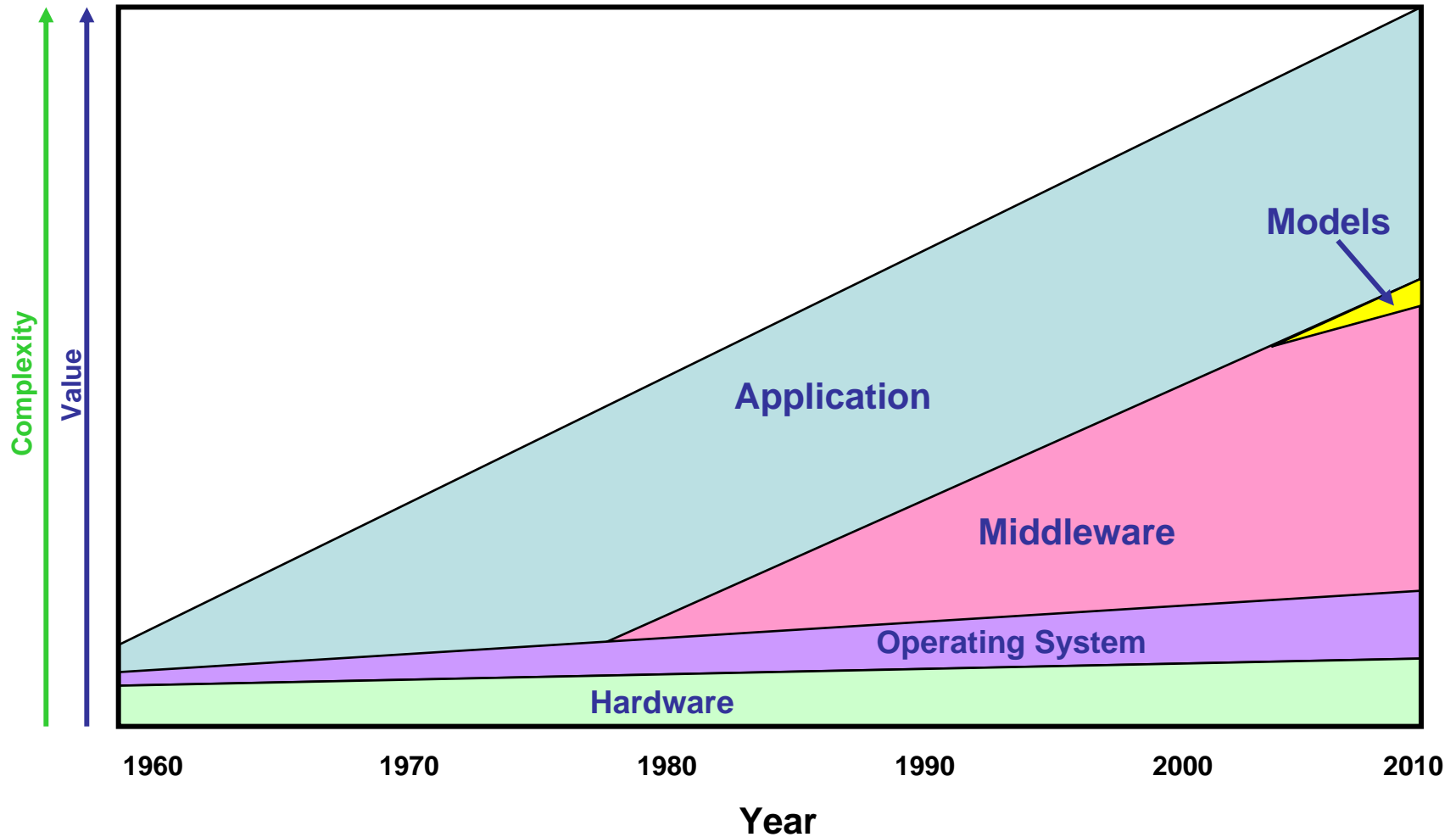|		
Manual	Automation ➡	Autonomic

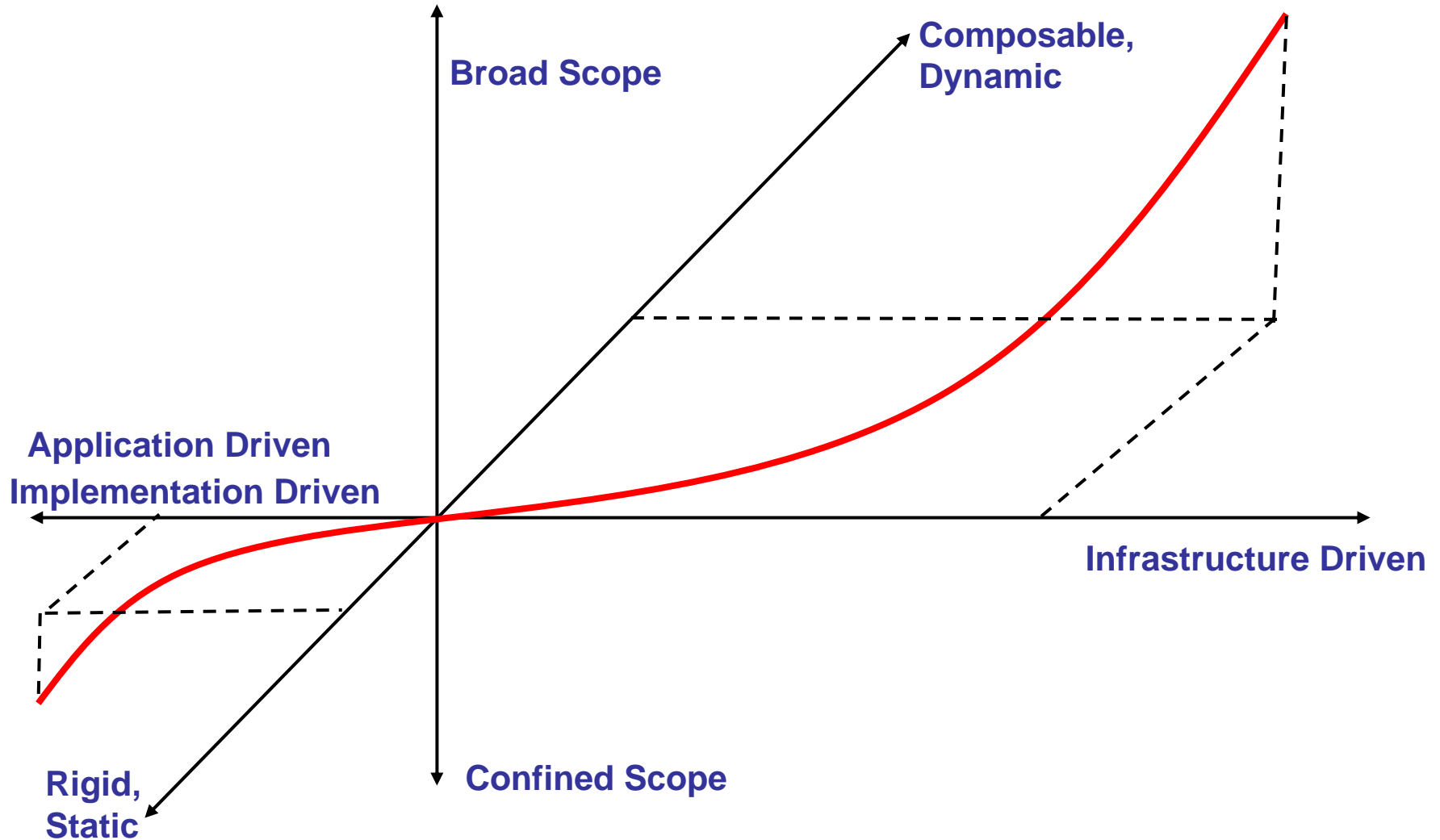|		
Proprietary	Open Standards ➡	Interoperable

Evolution of the System Stack

Architecture Landscape

Architecture Landscape

The Vision

Process Requirements → Process Modeling Services ← Existing Components

Interaction

Participate

Manage Execution

Process Execution

Optimize

Monitor

Analysis
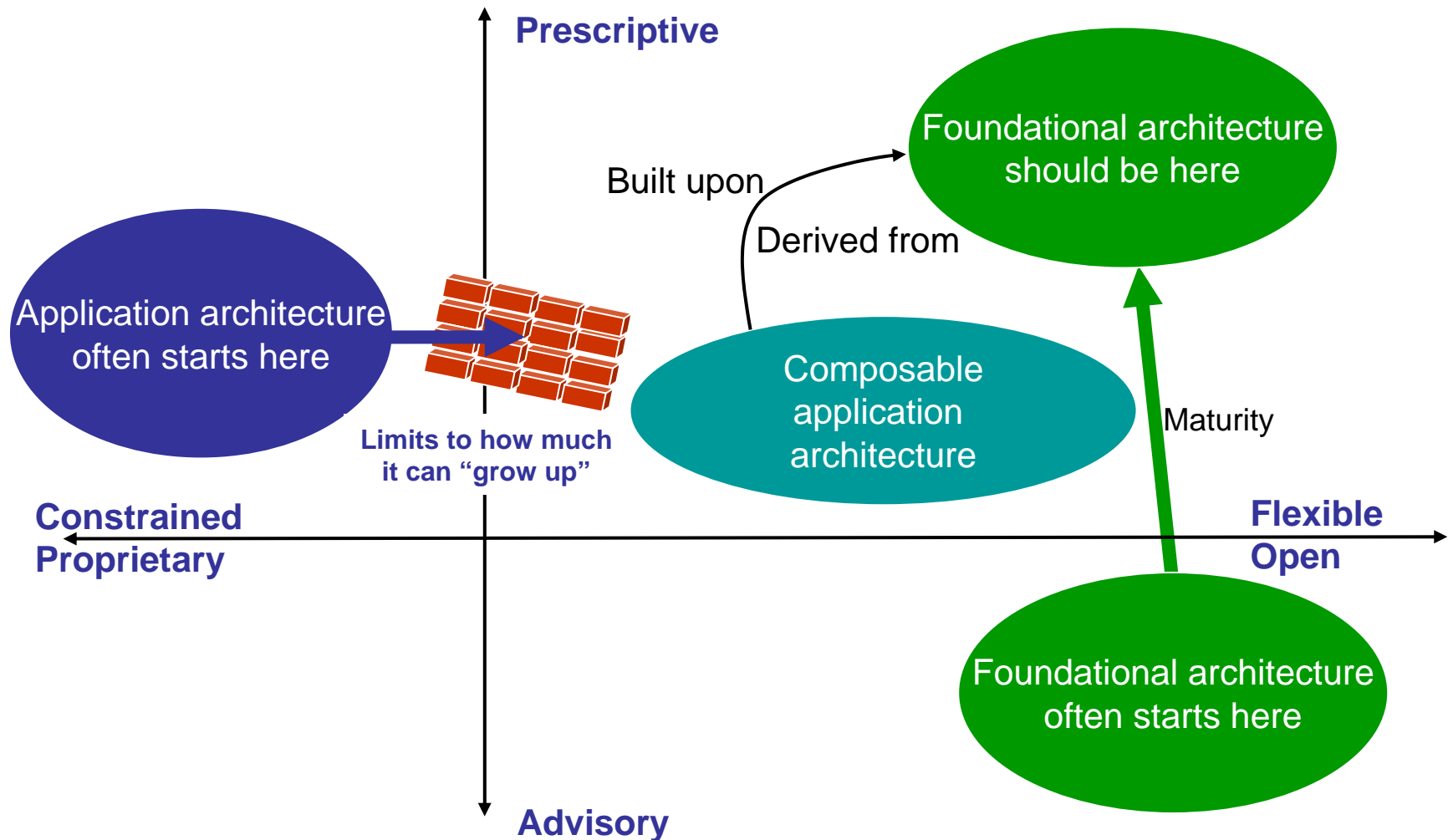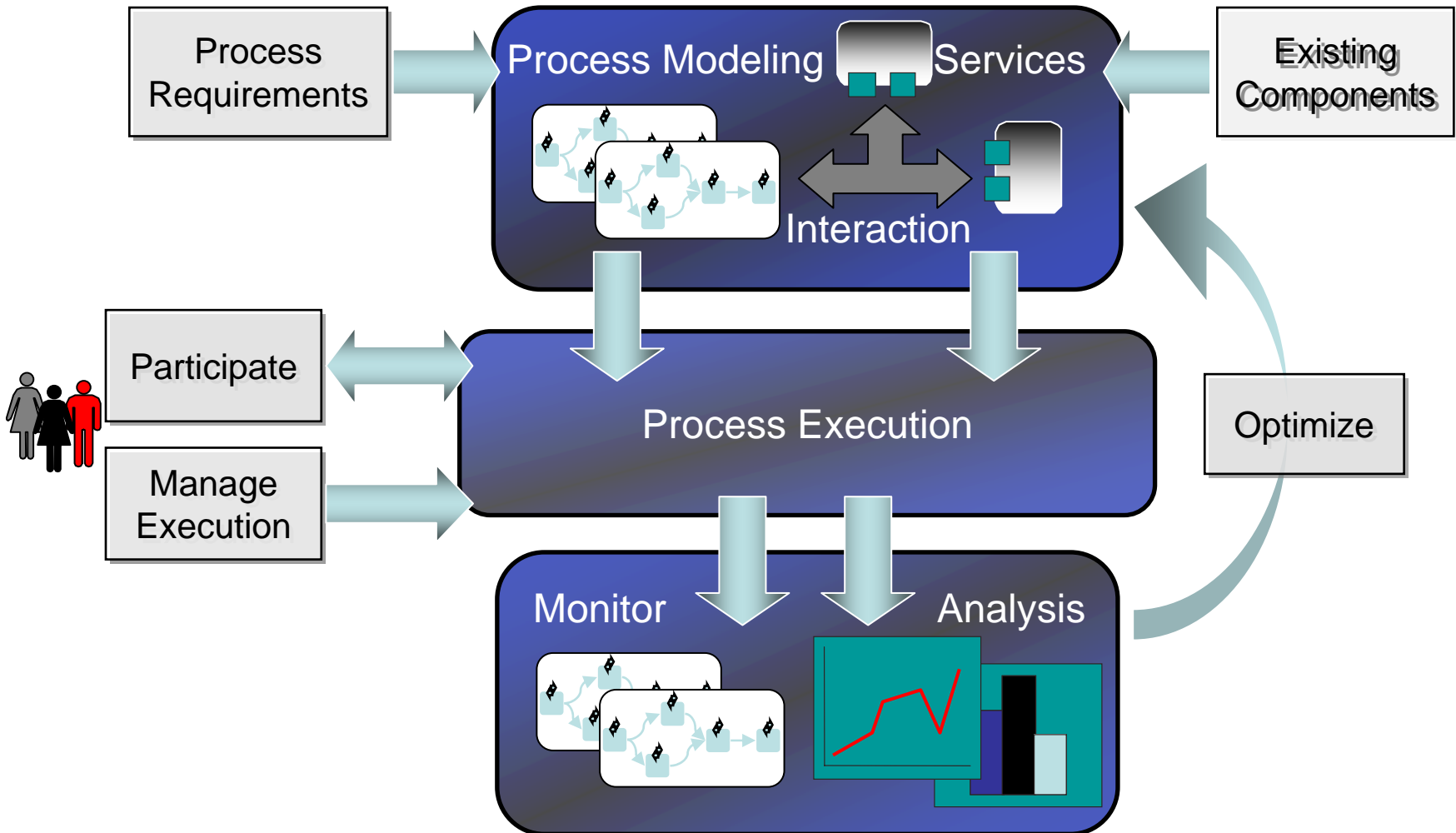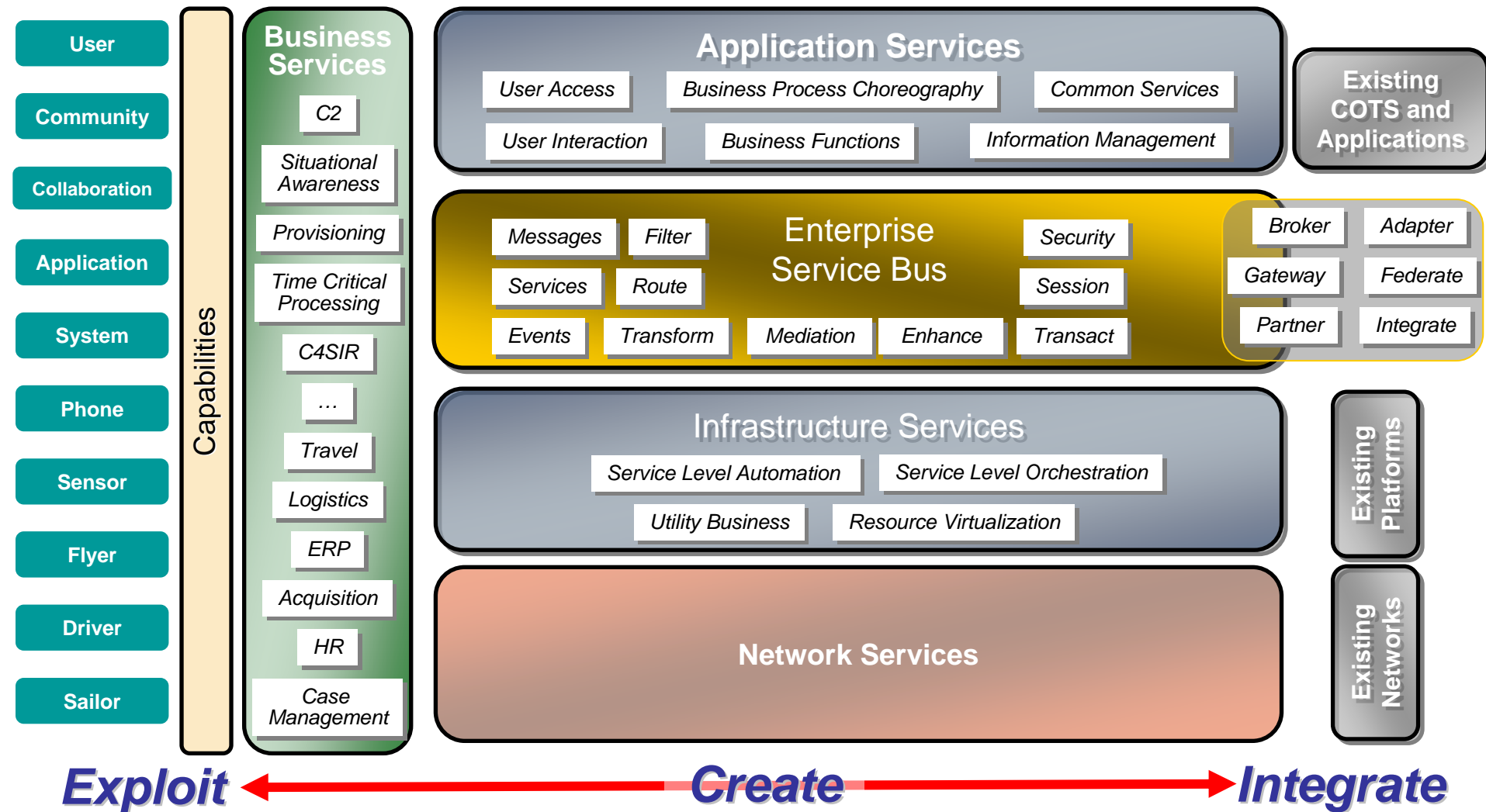
Lessons Learned: Simulate, Analyze, Evaluate Platform Independent Models first. Traceability provides effective feedback for funding decisions. Open Standards key to reuse - widespread adoption & industry investment

Service Oriented Architecture Reference Model

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Capabilities	Business Services	Application Services

User

Community

Collaboration

Application

System

Phone

Sensor

Flyer

Driver

Sailor

Business Services

- C2
- *Situational Awareness*
- *Provisioning*
- *Time Critical Processing*
- *C4SIR*
- *…*
- *Travel*
- *Logistics*
- *ERP*
- *Acquisition*
- *HR*
- *Case Management*

Application Services

User Access	Business Process Choreography	Common Services
User Interaction	Business Functions	Information Management

Existing COTS and Applications

Enterprise Service Bus

Messages	Filter		Security
Services	Route		Session
Events	Transform	Mediation	Enhance	Transact

Broker	Adapter
Gateway	Federate
Partner	Integrate

Infrastructure Services

Service Level Automation	Service Level Orchestration
Utility Business	Resource Virtualization

Existing Platforms

Network Services

Existing Networks

Exploit ← **Create** → **Integrate**

- Discover new applications for computing as we follow Moore's law

- Adopt and drive open standards

- Own the foundations and drive consistency in open architecture

- Build upon proven enterprise infrastructure to optimize investment and minimize risk

Thank You

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